optimus®
sound level meters

optimus green
Sound Level Meters for Environmental & Occupational Noise Measurements

Cirrus Research plc
dedicated to noise measurement

Applications

- Environmental noise impact assessments over short or long periods
- Occupational & Industrial Hygiene Noise Evaluations
- Tonal analysis using 1:3 Octave Band Filters
- Detailed analysis using audio recording
- Noise Ordinance & Community Noise Assessments
- Hearing Protector Selection using HML or 1:1 Octave Band Methods
- General Noise Measurements

Key Features

- Simple operation ensures that you get the functions you need quickly & easily
- Simultaneous measurement & data logging of all available parameters
- Simultaneous A, C & Z Frequency Weightings
- Simultaneous F, S & I Time Weightings
- Real-time 1:1 & 1:3 Octave Band Filters
- 14 Statistical Ln % values
- Single 120dB measurement range
- Audio recording during measurements for replay and analysis
- VoiceTag™ audio recording before each measurement for note taking
- Repeating measurements with manual or automatic control
- Latest digital technology with a high resolution colour OLED display and back-lit keypad for night-time measurements
- 4GB memory capable of storing over 10,000 measurements
- Compatible with outdoor noise measurement kits

Simple operation with advanced technology

The **optimus** sound level meters have been designed with ease of use as the most important feature which lets you get on with measuring and controlling the noise.

The instruments use the very latest in digital technology and industrial design techniques to make everything as clear and simple as possible.

Featuring a high resolution colour OLED screen and a keypad which will illuminate automatically in low light, the optimus instruments are ideal for any noise application.

The measurement data is displayed in a clear and simple format along with a real-time noise chart so that you can see how the noise varies with time.

All of the functions of the instrument are measured simultaneously, and with a wide 120dB measurement span you don't need to worry about choosing the right range.

A standard optimus can measure up to 140dB(A) and 143dB(C) Peak with the standard microphone and preamplifier, and up to 170dB using the optional MK:200EH High Level Noise microphone system.

Just switch on, calibrate and you are ready to go.

The ideal solution for environmental & occupational noise

The **optimus green** sound level meters are ideal instruments for both environmental & occupational noise and will give you all of the information you need, right at your finger tips.

Every measurement contains all of the available functions so there's no risk of selecting the wrong parameter or function.

Environmental Noise Measurements

For environmental noise applications, an **optimus green** is the ideal instrument.

Comprehensive measurement capability

The overall L_{eq}, L_{max} and statistical $L_{n\%}$ values (14 in total) are measured along with a range of noise profiles providing a complete picture of the noise under investigation.

Real-time 1:3 Octave Bands

The B versions (CR:172B & CR:171B) will measure and store Real-Time 1:3 octave bands from 6.3Hz to 20kHz throughout each and every measurement, with the overall value along with a time history stored automatically.

Audio recording

As well as the VoiceTag recording, the **optimus green** instruments provide audio recording during measurements.

This can be either started manually during the measurement or triggered using a sophisticated set of threshold parameters.

Audio recordings can be stored either as Studio 96/32 quality which can be used for later analysis, or as Standard 16/16 quality which can be used for replay and source identification.

Repeating measurements

Measurements can be either started manually or automatically by the measurement control functions.

This allows the instruments to make repeated measurements over long periods of time, ideal when the instrument is used with an outdoor noise measurement kit.

Occupational Noise & Industrial Hygiene Measurements

As well as the environmental noise functions, the **optimus green** instruments also provide a complete range of occupational noise functions.

UK & EU Noise at Work Regulations

If you are working to the UK Control of Noise at Work Regulations or the EU Physical Agents (Noise) Directive, L_{Aeq} and L_{CPeak} values are measured at the same time which allow the $L_{EP,d}$ ($L_{EX,8h}$) and the Peak Action Levels to be determined. The exposure calculator also displays a projected $L_{EP,d}$ ($L_{EX,8h}$) for the current measurement.

The L_{Ceq}-L_{Aeq} (C-A) value is also measured which can be used to select PPE using the HML method.

OSHA, MSHA & other regulations

If you need to meet regulations such as OSHA HC & NC, MSHA HC or ACGIH, the two "virtual" noise meters in the Dose View can be quickly configured to provide you with this information.

Octave Band Filters for Noise Control & Selecting Hearing Protection

The **optimus green** instruments also feature real-time 1:1 octave band filters which can be used to aid in the selection of PPE and for noise control applications.

NoiseTools Software

For many users, the most challenging part of a noise survey is the reporting and analysis of the results, and so having a simple way to view, analyse and print the information is essential.

The new NoiseTools software package gives you a quick and simple way to download, analyse and report your noise measurement information.

Intuitive and simple to use

The initial summary screen shows you the most commonly used information and, through simple icons, gives you access to the detailed measurement data. You can simply print the summary screen to get a quick measurement report.

For advanced users, each and every function measured by the instrument is available for review and analysis and the data can be exported for further use.

VoiceTag recordings can be played back for reference and are automatically stored with the measurement data.

Audio recordings can be played back to identify the noise source and analysis performed on the recordings.

Where Octave Band data is available, this information can be used by the program to calculate the level of protection from a range of hearing defenders and ear plugs.

Helping you keep your data organised

Over time, you may find that you have a large number of measurements, information and notes.

To help you keep your noise measurement data organised and easy to find, NoiseTools allows each measurement to be allocated to people, places and projects.

Measurements can be sorted or grouped by any parameter, person, place or project, and measurement reports created quickly and easily.

NoiseTools is fully compatible with the latest versions of Microsoft Windows and, as with all Cirrus software, updates are available free of charge from the Cirrus website.

NoiseTools is supplied free from any licensing restrictions or limits allowing you to install the program on as many PC's as needed at no additional cost. Updates for the NoiseTools software are available free of charge from the Cirrus Research plc website.

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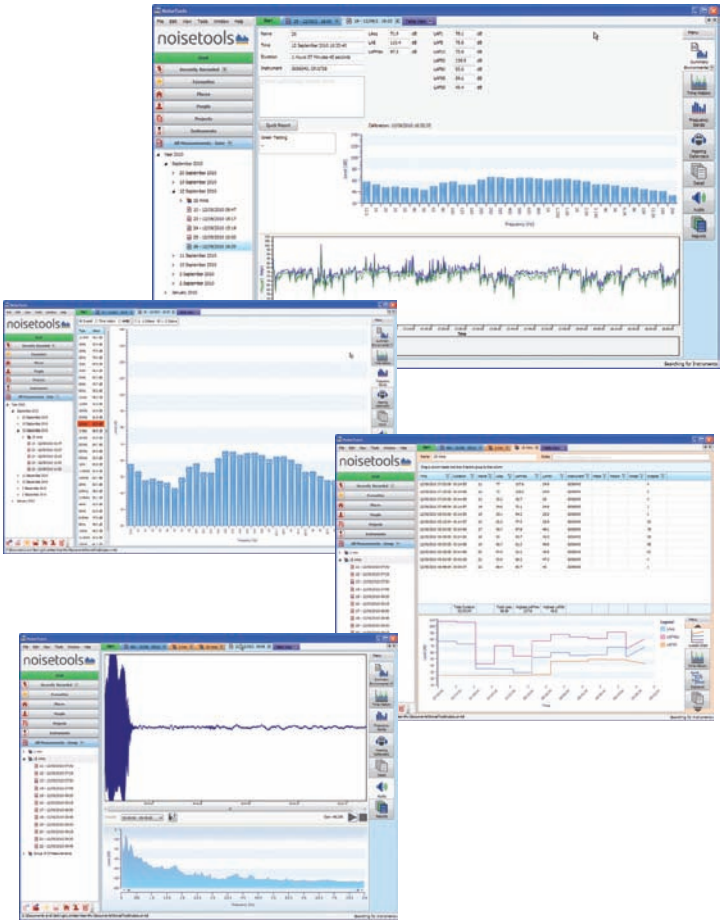

Instrument Range & Measurement Kits

The **optimus green** sound level meters can be used for a wide range of occupational and environmental noise applications and you can choose from two simple options to get the instrument that meets your needs.

Choose from Class 1 or Class 2 performance, and either Audio Recording with 1:1 Real-Time Octave Band Filters (A Version instruments) or Audio Recording with Real-Time 1:1 & 1:3 Octave Band Filters (B Version instruments).

All of the instruments can measure Sound Level functions plus L_{max} and L_{min} with all frequency and time weightings, as well as real-time 1:1 Octave Band filters, Integrated noise levels such as $L_{Aeq,t}$ and L_{AE}, C-A, Peak Sound Pressure and virtual noise meters for OSHA/MSHA/ACGIH.

14 independent Ln values are available along with the other measurement functions.

Specifications and a selection chart are available on the following page.

Complete measurement kits are available for the optimus instruments which contain the sound level meter, an acoustic calibrator, windshield, cables, batteries and accessories. The measurement kits contain all of the accessories needed to carry out a noise survey.

Specifications

Applicable Standards
IEC 61672-1:2002 Class 1 or Class 2 Group X
IEC 60651:2001 Type 1 I or Type 2 I
IEC 60804:2000 Type 1 or Type 2
IEC 61252:1993 Personal Sound Exposure Meters
ANSI S1.4 -1983 (R2006), ANSI S1.43 - 1997 (R2007)
ANSI S1.25:1991
1:1 & 1:3 Octave Band Filters to IEC 61260 & ANSI S1.11-2004

Microphone
Class 1 Instruments MK:224 pre-polarized
Class 2 Instruments MK:216 pre-polarized

Microphone Preamplifier
MV:200E Removable Preamplifier

Total Measurement Range:
20dB to 140dB RMS Single Range
Noise Floor: <18dB(A) Class 1, <21dB(A) Class 2

Frequency Weightings
RMS & Peak : A, C, & Z Measured Simultaneously
1:1 Octave Bands: 16Hz to 16kHz (31.5Hz to 16kHz displayed, 16Hz stored)
1:3 Octave Bands: 6.3Hz to 20kHz (Bands from 12.5Hz displayed, 6.3Hz, 8Hz & 10Hz stored & downloaded) - B Version
Additional Metrics: L_{Aeq} L_F (20Hz to 200Hz) & L_{eq} L_F (20Hz to 200Hz)

Time Weightings
Fast, Slow & Impulse Measured Simultaneously

Display
High resolution OLED display with ambient light sensor & illuminated keypad

Memory
4GB as standard with up to 10,000 measurements stored. Expandable to 128GB

Time History Data Rates (Global settings)
10ms, 62.5ms, 125ms, 250ms, 1/2 sec, 1 sec, 2 sec

VoiceTag Audio Recording
30 seconds of audio recording with each measurement

Audio Recording
Off, Manual, Threshold Triggered, Advanced Trigger
User options of Studio (96kHz/32bit) or Standard quality (16kHz/16bit) WAV format

Ln Statistical Values
14 independent statistical Ln values calculated from 1/16th L_{AF}
7 preset to L1.0, L5.0, L10.0, L50.0, L90.0, L95.0 & L99.0
7 user defined Ln values
NoiseTools allows for user control of frequency weighting used for Ln calculations. dB(A), dB(C) or dB(Z) available

Measurement Control
Measurement control with user selectable duration of manual, 1 min, 5 min, 10 min, 15 min, 30 mins, 1 hour, Lden
Automatic Synchronisation & Repeat

Integrators
Three simultaneous "virtual" noise meters
Integrator 1 is preset to Q3 for Leq functions
Integrators 2 & 3 can be configured with the following:
Exchange Rate: Q3, 4 or 5
Threshold: 70dB to 120dB (1 dB steps)
Time Weighting: None or Slow
Criterion Level: 70dB to 120dB (1 dB steps)
Criterion Time: 1 to 12 hours in 1 hour steps

Integrator Quick settings
EU, OSHA HC & OSHA NC, OSHA HC & ACGIH
MSHA HC & MSHA EC, Custom 1 & Custom 2

Size
283mm x 65mm x 30mm

Weight
300gms/10oz

Batteries
4 x AA Alkaline, battery life typically 12 hours

External Power
5v via USB Socket from PC or Power Supply
5v-15v via MultiIO socket

Tripod Mount
1/4" Whitworth socket

Connections
USB Type B to PC, Multi-pin IO for external power & RS232

Case
Material: High Impact ABS-PC with soft touch back & keypad

Environmental

Temperature	Operating -10°C to +50°C
	Storage -20°C to +60°C
Humidity	Up to 95% RH Non Condensing

Electromagnetic performance
IEC 61672-1:2002 & IEC 61672-2:2003, Except where modified by EN 61000-6-1:2007 & EN 61000-6-1:2007

Language options
English, French, German, Spanish as standard
Other language options may be available

Software Support
NoiseTools Download, Configuration & Analysis software supplied as standard. Compatible with Microsoft Windows XP, Vista & 7 (32bit & 64bit)

Measurement Functions[1]

CR:172A & CR:171A
L_{XY}, L_{XYMax}, L_{XYMin}
L_{Xeq}, L_{CPeak}, L_{ZPeak}, L_{Ceq}-L_{Aeq}, L_{XE}
Graph of Short L_{Aeq}, L_{CPeak}
Measurement Run Time
Integrators 2 & 3: TWA, Dose %, Est Dose %
Real-Time 1:1 Octave Bands (Graphical & Numeric)
14 Statistical Ln% Values

Stored Functions
L_{XYMax} & Time History of L_{XYMax}
L_{Aeq}, L_{Ceq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}
Time History of L_{Aeq}, L_{Ceq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}
Integrators 2 & 3: L_{AVG}, TWA. % Dose
Time History of L_{AVG}
1:1 Octave Bands: Overall L_{eq} & L_{eq} Time History for each band
Ln Values: 14 independent statistical values
Audio Recording During Measurement
Measurement Run Time
Time & Date of Measurement Start

CR:172B & CR:171B
L_{XY}, L_{XYMax}, L_{XYMin}
L_{Xeq}, L_{CPeak}, L_{ZPeak}, L_{Ceq}-L_{Aeq}, L_{XE}
Graph of Short L_{Aeq}, L_{CPeak}
Measurement Run Time
Integrators 2 & 3: TWA, Dose %, Est Dose %
Real-Time 1:1 Octave Bands (Graphical & Numeric)
Real-Time 1:3 Octave Bands (Graphical & Numeric)
L_{eq} L_F (20Hz to 200Hz)
14 Statistical Ln% Values

Stored Functions
L_{XYMax} & Time History of L_{XYMax}
L_{Aeq}, L_{Ceq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}
Time History of L_{Aeq}, L_{Ceq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}
Integrators 2 & 3: L_{AVG}, TWA. % Dose
Time History of L_{AVG}
1:1 & 1:3 Octave Bands: Overall L_{eq} & L_{eq} Time History for each band
Ln Values: 14 independent statistical values
Audio Recording During Measurement
Measurement Run Time
Time & Date of Measurement Start

where x=A ,C ,Z; y= F, S, I

Other functions may be calculated by the NoiseTools software and displayed on download.

Notes
1. For details of the displayed and stored parameters, please refer to the optimus green technical specification datasheet.

All specifications, features and values are typical and are subject to change without notice.

Instrument Selection

Function	Class 1	Class 2	Sound Level Functions	Leq/Peak Functions	TWA/Dose Functions	Data Logging	Audio Recording	VoiceTag Recording	1:1 Octave Band Filters	1:3 Octave Band Filters	Ln/Timer	Software Support	Measurement Kit
Instrument													
CR:172A		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	CK:172A
CR:171A	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	CK:171A
CR:172B		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	CK:172B
CR:171B	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	CK:171B

Standard Accessories
The **optimus** sound level meters are supplied, as standard, with the following accessories:
User Manual
Certificate of Calibration
USB Data/Power Cable
Windshield
NoiseTools Software CD

Measurement Kits
The **optimus** sound level meters are available as a complete measurement kit with the following accessories:
optimus Sound Level Meter
CR:514 Class 2 or CR:515 Class 1 Acoustic Calibrator
UA:237 90mm Windshield
CK:280 Carrying Case
User Manual & Certificates of Calibration
USB Data/Power Cable & NoiseTools Software CD

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dedicated to noise measurement

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ISO 14001:2004
EMS 552104

ISO 9001:2008
FM 531001